Ecofocus

CARY INSTITUTE OF ECOSYSTEM STUDIES

FALL 2025

A TREE THAT LOVES LIGHTNING

Evan Gora

Each year, lightning kills more than 300 million trees. But Cary forest ecologist Evan Gora has discovered the first known tree species that benefits from getting zapped with millions of volts of electricity. The trees may have even evolved to act as lightning rods.

The discovery, published in *New Phytologist* in March, received worldwide attention and coverage in the New York Times, BBC, NPR, and many other news outlets.

While conducting fieldwork in Panama in 2015, Gora and his colleagues came across a *Dipteryx oleifera* tree that had survived a strike with little damage — even though the jolt had been strong enough to blast a parasitic vine out of its crown and kill more than a dozen neighboring trees.

"Seeing trees that get struck by lightning without any damage was just mind-blowing," Gora recalled. Over time, the team encountered other *D. oleifera* trees — also known as almendros — thriving after lightning strikes, so they decided to take a closer look.

Using a custom-made lightning location system, the team tracked the outcomes of 93 strikes — nine strikes to *D. oleifera* and 84 strikes to trees of other species — in a tropical forest in Panama.

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Bulletin Board: Announcements and Events

FROM OUR PRESIDENT

Dear Friends,

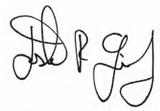
Since its founding in 1983, Cary Institute of Ecosystem Studies has sought to understand our natural world — to ensure ecosystem resilience and human wellbeing in the face of rapid, unpredictable, and unprecedented change. Here in the Hudson Valley, our researchers are investigating how urban greening can aid in protecting biodiversity and human health. Meanwhile, our Hudson River team recently detected the most extensive harmful algal bloom in our four decades of monitoring the river. While our roots are local, Cary has a global reach, with a growing expertise in tropical forest ecology, as featured in the story on the tree that loves lightning. Wonder suffuses everything we do.

Briefly, I want to step back a bit and reflect on our future. The US research endeavor is the most respected in the world, and a driver of our country's economic success. But today, science is under attack, and this is hitting home. Federal funding, which was 30% of Cary's budget last year, has been reduced, and even greater reductions are proposed. These are challenging times to be a scientist, to run a science institution, and to be a person who cares about the world our children and grandchildren will inherit. Choices we make now will shape that future.

Ecological disruption is happening faster, and at a greater scale, than ever before. The impacts of our changing climate are felt by all of us: this includes rising temperatures, more frequent and intense weather events like heatwaves, heavy rainfall, flooding, and fires. Our work has never been more urgent, or important.

Thank you for your continued support. It is essential for ensuring we persist, thrive, and grow to meet the challenges of our time.

With gratitude,



Joshua R. Ginsberg, PhD

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A Tree That Loves Lightning, Cont. from p.1

For two to six years after the strike, the team measured tree survival rates, crown and trunk condition, number of parasitic vines or lianas, and neighboring tree mortality.

All nine *D. oleifera* trees survived direct lightning strikes with only minor damage. In contrast, directly struck trees of other species were badly damaged, losing 5.7 times more leaves from their crowns; 64% died within two years.

Because of these benefits, the team thinks alemendro trees may be specially adapted to attract lightning.

Lightning strikes appear to give *D. oleifera* an advantage in competing for light, space, and nutrients. When each *D. oleifera* tree was zapped, an average of 9.2 neighboring trees died as the electricity traveled between trees. Lightning strikes also decreased *D. oleifera*'s parasitic liana infestations by 78%. Drone-made 3D models of canopy height showed that *D. oleifera* trees tend to be about four meters taller than their nearest neighbors, likely because lightning kills their taller competitors.

As Gora puts it, "A *Dipteryx oleifera* tree is better off being struck than not."

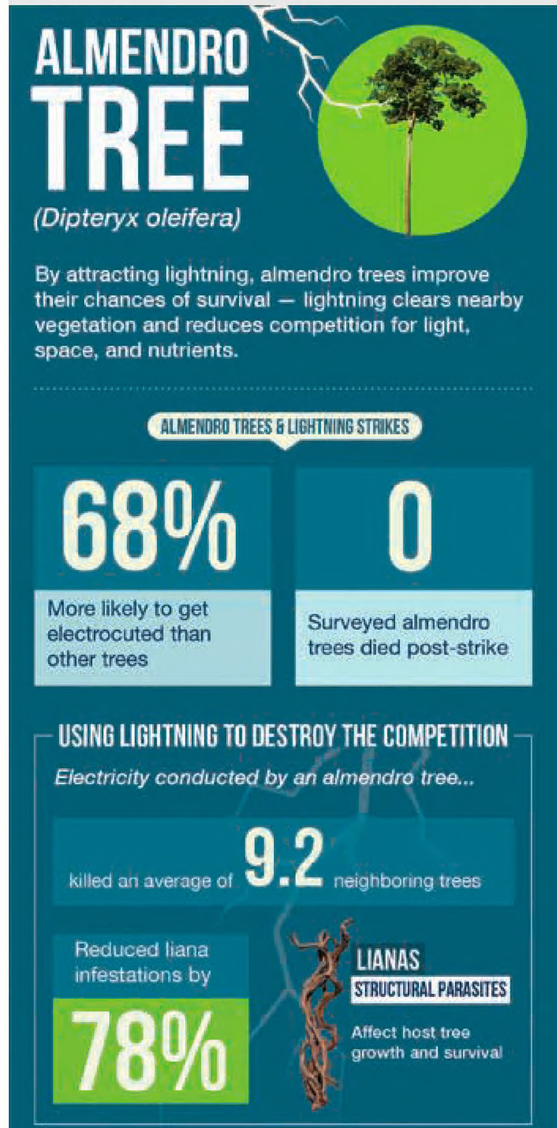
Because of these benefits, the team thinks *D. oleifera* trees may be specially adapted to attract lightning. With their distinctive height and unusually wide crowns, they may be up to 68% more likely to get electrocuted than other trees, according to the team's calculations.

The study was funded in part by the National Science Foundation and the Smithsonian Tropical Research Institute.

Next, the scientists aim to investigate what electrical or structural traits allow these trees to survive lightning strikes. To better understand how common this phenomenon is, they also want to explore lightning tolerance in other species.

Insight into lightning and its role in shaping forests is important for predicting changes in biodiversity and carbon storage, and for informing tropical reforestation efforts. With lightning on the rise in many regions due to climate change, its influence on tree competition may increase, potentially favoring lightning-tolerant species like *Dipteryx oleifera*.

A *D. oleifera* after being struck by lightning. The tree survived with minimal damage, and benefited from having its parasitic vines and competing neighbors removed by the strike.


ALMENDRO TREE
(Dipteryx oleifera)
By attracting lightning, almendro trees improve their chances of survival — lightning clears nearby vegetation and reduces competition for light, space, and nutrients.
ALMENDRO TREES & LIGHTNING STRIKES
68%
More likely to get electrocuted than other trees
0
Surveyed almendro trees died post-strike
USING LIGHTNING TO DESTROY THE COMPETITION
Electricity conducted by an almendro tree...
killed an average of 9.2 neighboring trees
Reduced liana infestations by
78%
LIANAS
STRUCTURAL PARASITES
Affect host tree growth and survival

CARY PARTNERS WITH SCENIC HUDSON TO EXPLORE URBAN BIODIVERSITY

Newburgh Environmental Justice Fellows survey plants and animals during a Bioblitz in Newburgh, NY.

Adding trees and other plants to neighborhoods can help cities mitigate extreme heat and flooding. But how do those changing green spaces impact plants, animals, and people? To find out, Cary's Shannon LaDeau is partnering with the environmental organization Scenic Hudson in three cities: Kingston, Newburgh, and Poughkeepsie.

Called Defining Urban Biodiversity, the project uses multiple methods, including camera traps, vegetation surveys, and community input to evaluate how adding, removing, and connecting areas with tree canopy influences the types of animals in each green space, how they interact with each other and plants, and what this biodiversity might mean for people living nearby.

In June 2025, LaDeau began documenting the composition of plants and animals, including birds, pollinators, and ticks, at 30 sites across the three cities. Sites vary in size and makeup, ranging from paved areas and vacant lots to parks and forest patches. The monitoring will continue through at least fall 2027.

Community members can help with the plant and animal surveys by joining one of the Defining Urban Biodiversity projects on iNaturalist.

So far, the camera traps have photographed 24 different species, including woodchucks, raccoons, skunks, gray and red foxes, deer, bear, bobcats, and a lot of squirrels. LaDeau is particularly interested in how these photographs depict interactions between species, including domestic cats following raccoons, coyotes carrying prey, and tick infestations on white-tailed deer.

"Biodiversity is a necessary component of resilient cities," said LaDeau. "But when urban green spaces aren't managed, they can open gateways for species that become problematic for people, including those perceived as pests, such as rats, mosquitoes, and poison ivy. These seemingly natural areas can also attract wildlife that are not well-suited for our urban neighborhoods, like deer and bear. The Defining Urban Biodiversity project will establish a research infrastructure and database to support urban conservation and resilient development within the Hudson Valley."

Community members can help with the plant and animal surveys by joining one of the Defining Urban Biodiversity projects on iNaturalist. (There's a different project page for each of the three cities.) Participants will receive prompts about which types of species to look for and in what parts of their city.

"Engaging residents as scientists enables them to use this research to influence planning processes occurring in all three cities," said Kayla Patel, an urban planner and project manager at Scenic Hudson. "This study provides a great reason for people to be outside in their neighborhoods, lean into wonder and curiosity about local ecosystems, and deepen their bonds with places, plants, animals, and forms of life wherever they live and spend time."

Over the coming years, the data from this project will inform efforts to plan, manage, and implement conservation programs that improve urban green spaces for all.

Scan to download the iNaturalist app

iPhone ←

Android →

You can be a part of making this research possible.

CARYINSTITUTE.ORG/DONATE

WELCOMING TWO NEW CARY SCIENTISTS

Cary Institute recently added two new members to our team of core scientists.

Aquatic biogeochemist **Taylor Maavara** uses large-scale models, machine learning, and field research to understand the role of rivers in global carbon and nutrient cycles. Her work has helped to reveal how river dams impede the flow of carbon and nutrients (such as nitrogen and phosphorus) at local to global scales, with the potential to disrupt fisheries, cause eutrophication, and increase greenhouse gas emissions.

Another project focuses on quantifying how much carbon is absorbed versus emitted by rivers across the US, with implications for the global carbon budget. Maavara comes to Cary from the University of Leeds in the UK.

Urban ecologist **Elizabeth Cook** explores how nature-based solutions can support cities in becoming more resilient and equitable in the face of climate change and rapid urbanization. She comes to Cary from Barnard College, where she will retain an affiliation. Cook's research applies three complementary approaches: using traditional ecological methods in cities, examining people's interactions with nature to better plan and manage urban ecosystems to support human wellbeing, and collaborating with decision-makers to improve urban sustainability and resilience. With city decision-makers across the US and Latin America, she has co-developed more than 45 future scenarios exploring how cities might achieve resilience to extreme heat, flooding, drought, and equity challenges by 2100.

Cary is delighted to welcome Maavara and Cook, and looks forward to seeing how they will enhance and expand the Institute's legacy of transformative research in aquatic and urban ecology.

Taylor Maavara

Elizabeth Cook

SPOTLIGHT ON FIELD RESEARCH

Members of the Gigante project research team received drone training by Vanessa Rubio in Cameroon earlier this year. The drone will be flown monthly over 1,500 hectares of tropical forest to identify disturbances. A field team will then collect ground data to quantify when, where, and why giant tropical trees die.

Team members include collaborators from the Congo Basin Institute, the Cameroonian Ministry of Forests and Wildlife, conservation members of the Dja Faunal Reserve, and the French National Research Institute for Sustainable Development.

Reese Poindexter | Research Assistant

Reese works in the Ostfeld lab, where they trap and release small mammals to inventory their tick-loads, to inform a long-term study on how biodiversity shapes Lyme disease risk. They also collect environmental samples as part of this project.

Working at Cary has offered me access to a strong community of scientists who provide support and guidance as I navigate my own path forward. As someone who is interested in mammals and disease ecology, it's been an invaluable learning experience.

TALKS

The Afterlife of Trees: A Science Conversation with Amy Zanne

Discover the role deadwood plays in ecosystems and the myriad creatures that rely on fallen trees.

caryinstitute.org/lecture-videos

Beyond the Sea: The Hidden Life in Lakes, Streams, and Wetlands

A foray into Earth's inland waters and the remarkable species they contain.

caryinstitute.org/lecture-videos

SAVE THE DATES

Thursday, Feb 12 at 7pm
Speaker: Laura Heady
I Love a Rainy Night: The Rhythm of Forest Amphibians

Friday, March 13 at 7pm
Speaker: Robin Wall Kimmerer
On Ecology, Indigenous Knowledge, and Caring for the Earth

caryinstitute.org/events

Ecofocus is published by Cary Institute of Ecosystem Studies, an independent nonprofit center for environmental research. Since 1983, our scientists have been investigating the complex interactions that govern the natural world and the impacts of climate change on these systems. Our findings lead to more effective management and policy actions and increased environmental literacy. Staff are global experts in the ecology of: cities, disease, forests, and freshwater.

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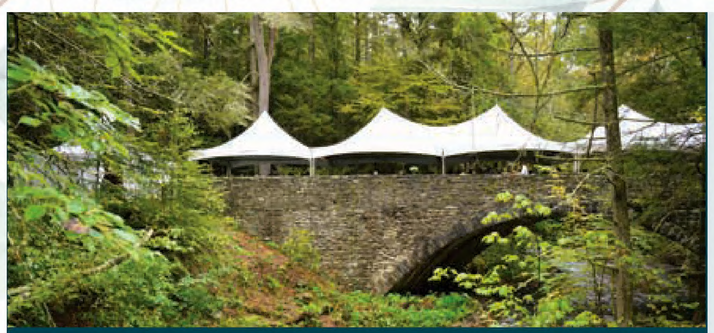
LUNCH ON THE BRIDGE 2025



President Josh Ginsberg and Board Chair Scott Ulm were thrilled to welcome over 165 guests to our Lunch on the Bridge on Sunday, September 21. Co-chairs Elizabeth & Will Hewitt, Robbianne Mackin & Eric Roberts, Barbara Tober, and Helen & Michiel van der Voort and the Host Committee did a great job bringing together our steadfast supporters and many new friends to the Institute.

Each year, Lunch on the Bridge is held on the beautiful stone bridge near the Fern Glen, which is just the right size for an intimate yet joyful gathering of our Cary supporters — those who understand the importance of Cary Institute's work to human health and wellbeing, and the health of our planet.

All enjoyed sumptuous food and libations, thanks to The Farmer's Wife, Shady Knoll Orchards & Distillery, and All That Java. Barbara Han then captivated guests with insights into how diseases can jump from animals — such as dogs, raccoons, ducks, and mice — to humans, and the surprising backyard conditions that can make such spillovers possible.

The finale? A spontaneous trumpet serenade as people departed, providing the perfect ending to a wonderful event.

For more pictures from the event, scan the QR code.

"Michiel and I are honored to serve as Lunch on the Bridge co-chairs again this year. You couldn't find a more charming location to gather with friends and neighbors! We love introducing others to Cary Institute's world-renowned science in this way. Since joining the Aldo Leopold Society in 2018, we have become passionate supporters of the collaborative, innovative research Cary scientists conduct for a more sustainable future. And their commitment to sharing their knowledge with ecologists at every level is something we feel passionately about, and fully endorse."

- Helen van der Voort

Aldo Leopold Society's Woodcock Walk, April 2025

BECOME A MEMBER OF THE ALDO LEOPOLD SOCIETY

Join a dedicated community of advocates advancing environmental science and stewardship.

As a member, you will receive newsletters and invitations to events throughout the year, as well as special opportunities to interact with Cary Institute's scientific staff and educators.

If you'd like more information, contact Vicki Doyle at 845-677-7600 x203 or doylev@caryinstitute.org

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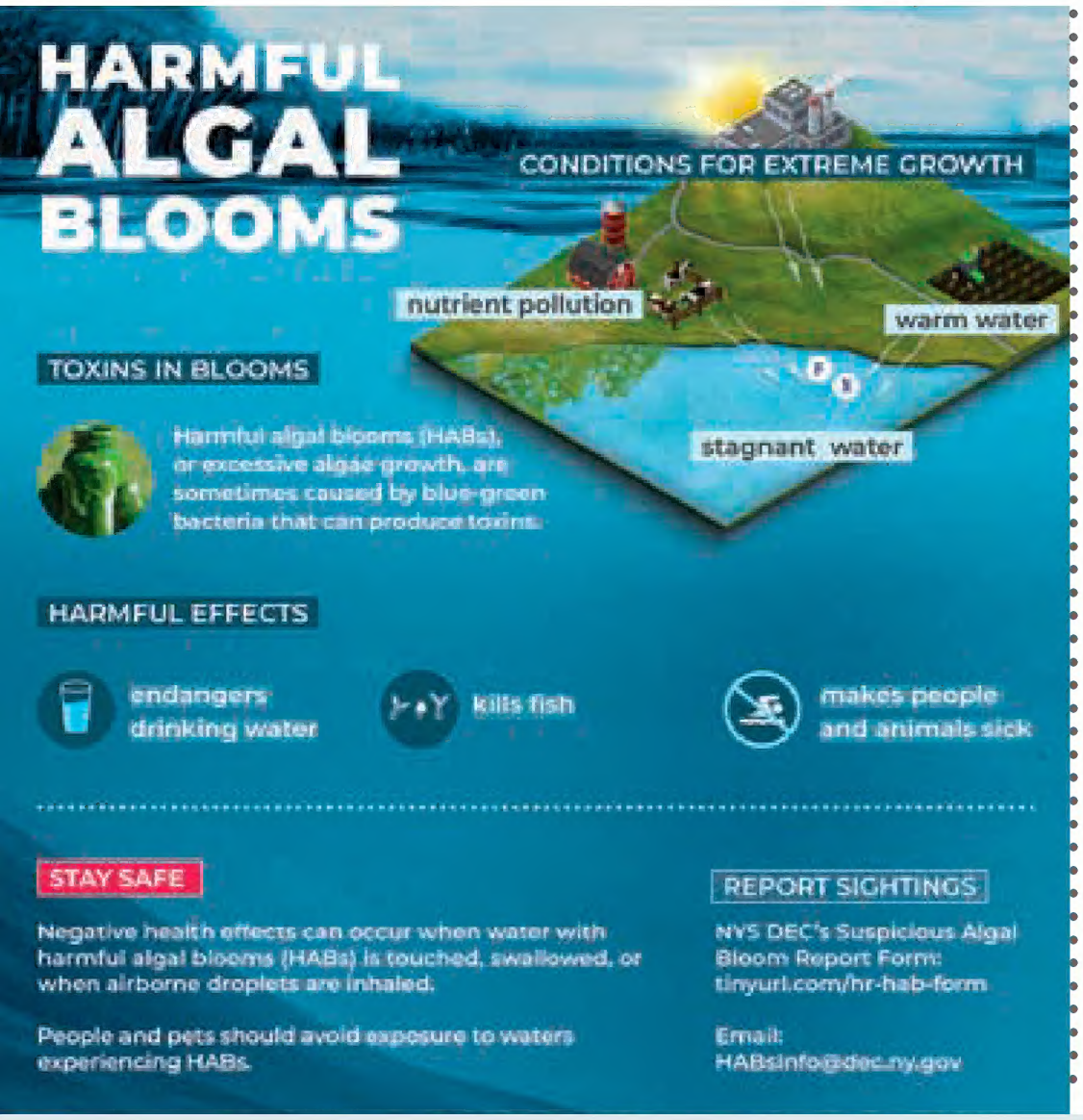
HARMFUL ALGAL BLOOMS
CONDITIONS FOR EXTREME GROWTH
nutrient pollution
warm water
stagnant water
TOXINS IN BLOOMS
Harmful algal blooms (HABs), or excessive algae growth, are sometimes caused by blue-green bacteria that can produce toxins.
HARMFUL EFFECTS
endangers drinking water
kills fish
makes people and animals sick
STAY SAFE
Negative health effects can occur when water with harmful algal blooms (HABs) is touched, swallowed, or when airborne droplets are inhaled.
People and pets should avoid exposure to waters experiencing HABs.
REPORT SIGHTINGS
NYS DEC's Suspicious Algal Bloom Report Form: tinyurl.com/hr-hab-form
Email: HABsInfo@dec.ny.gov

CARY MONITORING UNCOVERS EXTENSIVE HARMFUL ALGAL BLOOM IN THE HUDSON

Sophia Atkinson

Processing chlorophyll and phycocyanin to gauge the severity of algal bloom activity.

In September, Cary Institute researchers observed a massive algal bloom in a large stretch of the Hudson River from Kingston to Staatsburg. This is the largest cyanobacteria bloom they have detected in almost 40 years of monitoring the Hudson River.

The bloom was confirmed to be *Microcystis*, a cyanobacteria that can produce toxins harmful to people, pets, and wildlife. They encountered it while collecting samples for an ongoing survey of the river's lower food web, funded by the Hudson River Foundation.

"The magnitude and extent of this cyanobacteria bloom is unprecedented..."

"In slower-moving parts of the river, green paint-like swirls coated the water's surface, and along the shoreline you could see green clumps," recalled Cary research technician Sophia Atkinson. "When we pulled out the net we'd been towing in the river's channel, it was so clogged with *Microcystis* that it wouldn't drain properly."

The New York State Department of Environmental Conservation (NYS DEC) confirmed additional harmful algal blooms in the Hudson River near Beacon, Hyde Park, Tivoli, and Hudson, as well as in the Wallkill River and Rondout Creek, which feed into the Hudson near Kingston.

"The magnitude and extent of this cyanobacteria bloom is unprecedented and concerning. While *Microcystis* is often observed in the Hudson, and sometimes produces blooms, this is by far the largest bloom we have observed," said Cary aquatic ecologist Chris Solomon.

Researchers are looking into the potential causes of the bloom and how to inform its management.

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